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The genus *Ugandatrichia* Mosely (Trichoptera, Hydroptilidae) in Japan

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Abstract

The tropical-subtropical caddisfly genus *Ugandatrichia* Mosely (Hydroptilidae) is recorded from Japan for the first time, with 2 species. *Ugandatrichia nakijinensis* Ito **sp. nov.** is described from Okinawa-jima and Amami-oshima, in the south of Japan, based on adults and immature stages. *Ugandatrichia taiwanensis* Hsu and Chen, originally described from Taiwan, is recorded and redescribed based on material from Iriomote-jima and Ishigaki-jima, in the southernmost part of Japan. Larvae of both live on smooth rock surfaces in very fast flowing waters.

Key words: new species, new record, adult, larva, Taiwan

Introduction

Ugandatrichia Mosely, 1939, is a tropical and subtropical genus of Hydroptilidae, Trichoptera, and is distributed in the Oriental (19 species), Afrotropical (11 species) and Australasian (1 species) regions (Morse, 2012), but was not known previously in Japan (Ito, 2012). In this paper, the genus is recorded from southern Japan for the first time with the description of a new species and new record of a Taiwanese species.

Material and methods

Association of adult and immature stages was established by rearing larvae to adults or from observation of mature pupae enclosed in cases with their larval exuviae. Male and female genitalia were figured after treatment in dilute KOH. Morphological terms mainly follow Wells and Dudgeon (1990) for adults, Wiggins and Currie (2008) for pupae and Wiggins (1996) and Malicky (1999) for larvae. The type series of the new species are deposited in the collections of the Natural History Museum and Institute, Chiba (CBM–ZI). Other specimens are deposited in the collection of the first author. All specimens are preserved in 70–80% ethyl alcohol. Collection methods and collectors are abbreviated as follows: S, sweep netting; AO, Ayuko Ohkawa; TI, Tomiko Ito.

Genus *Ugandatrichia* Mosely, 1939

Ugandatrichia Mosely, 1939, 36, Kenya. Type species: *Ugandatrichia minor* Mosely, by original designation.
Moselyella Kimmins, 1951, 195–196. Type species: *Ithytrichia violacea* Morton, by original designation and monotypy. Synonymized by Schmid (1960).
Ugandatrichia: Marshall, 1979, 195, 198–199.

Adult. Head with pairs of large ellipsoidal dorsal setal warts, gently curved long dorso-lateral warts and small round postero-lateral warts; antennae usually long, 30–37 segments, ocelli 3. Maxillary palpi 5-segmented, 2 basal segments short, other segments cylindrical, apical segment longest; labial palpi 3-segmented, basal segment short, other segments cylindrical. Pronotum with pairs of round mesal warts and round lateral warts; mesoscutellum diamond-shaped.

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Wings relatively broad but still long and acuminate as typical of the Hydroptilidae, forewings with apical forks II and III and often discoidal cell, hindwings with apical forks II, III and V and often discoidal cell, crossveins often indistinct, forewings with dense dark setal coverings and sometimes with oval patch of creamcoloured scale-like hairs (androconia according to Hsu & Chen 2002). Spur formula 0, 3, 4.

Male with pair of long, membranous eversible processes (scent organs) arising laterally between tergite and sternite of segment II in some species. A small semi-membranous ventral process present in both sexes, on sternum VII in male and sternum VI in female.

Male genitalia. Segment IX well developed, variously with dorsal and ventral posterior and anterior excisions; segment X variable in development, from bearing median lobe and lateral processes to difficult to discern; inferior appendages large, broad and elongate in some species, bifurcate at apical half in some species, with few spurs mesally or meso-dorsally in some species, without superior or inner lobes; phallus slender, with distinct proximal and distal regions, divided by constriction adjacent to spiral titillator.

Female genitalia. Known for few species. Sternite VII with diagnostic patch or row of setae in some species; sternite VIII with sclerotized process or some other distinctive marking.

Final instar larva. Known for few species. Cylindrical or flattened dorsoventrally. Head dark. Thoracic legs short and stout. Abdominal segments I to VII with some tergal and pleural sclerites, presence and shapes of sclerites appearing to be species specific.

Japanese name. Ô·hime-tobikera-zoku (newly given here).

***Ugandatrichia nakijinensis* Ito sp. nov.**
(Figs.1–4, 6)

Adult. Wings black, densely covered with long black hairs, with oval patch of creamcoloured short scales (androconia according to Hsu & Chen 2002) at middle of each male forewing. Antennae black at basal 1/3 and white at apical 2/3.

Male (Fig. 1). Length of forewing, hind wing and body 4.0–4.2 mm, 3.8–3.9 mm and 3.0– 3.4 mm, respectively. Antennae each 32–33-segmented and 1.7–1.8 mm long. Wing venation somewhat variable locally, individually and even in opposite sides of single specimen; forewings each with apical forks II and III, hind wings each with forks II, III and often V.

Genitalia (Fig. 1). Segment IX large, round in lateral view, large and quadrate in dorsal view. Dorsal plate membranous, tapered medially and with pair of round humps laterally. Subgenital plate distinctly longer than dorsal plate, broad-based, tapered to narrow apex, with pair of setae subapically. Inferior appendages stout, large, setose; twice as long as subgenital plate, parallelsided with round apices in dorsal and ventral views; thickened at middle, tapered distally, somewhat rounded apically in lateral view; 2 pairs of sclerotized spurs present, the first medially on mesal margin, second on dorsal surface between first spur and base of each inferior appendage. Paired sclerotized processes above inferior appendages; in lateral view broad-based, tapered to narrowly rounded apices and curved ventro-posteriorly; rod-shaped in dorsal view. Phallus long, titillator curled once around half-way, ejaculatory duct slightly projected.

Female (Fig. 2). Length of forewing, hind wing and body 4.5 mm, 3.6 mm and 3.3–3.8 mm, respectively. Antennae each 30-segmented and 1.8 mm long. Wing venation of females variable as in males; forewings each with apical forks II and III, hind wings each with forks II (absent in some specimens), III and V. Segment VII: Tergite and sternite fused laterally, weakly sclerotized; tergite subquadrate with dense row of very long setae near posterior margin; sternite straight anteriorly, slightly convex laterally, with pair of patches of short setae posteriorly. Segment VIII almost as long as segment VII, sternite with postero-medial excision and 4 pairs of long setae posteriorly.

Pupa (Fig. 2). Flattened dorso-ventrally, up to 4.3 mm long, milky white. Mandibles very sharp. Antennae and wing pads almost reaching to end of abdomen. Hook plates on abdominal segments III–VII; longitudinally long hook plates at middle of segments III–VII with about 35 hooks each; small round hook plates at posterior margins of segments III–V with 5–7 hooks. Lateral fringes and anal processes absent.

Larva (Figs. 3–4). **Final instar larva** (Figs. 3–4). Cylindrical, length up to 6 mm, sclerotized parts black or deep brown, other parts milky white.

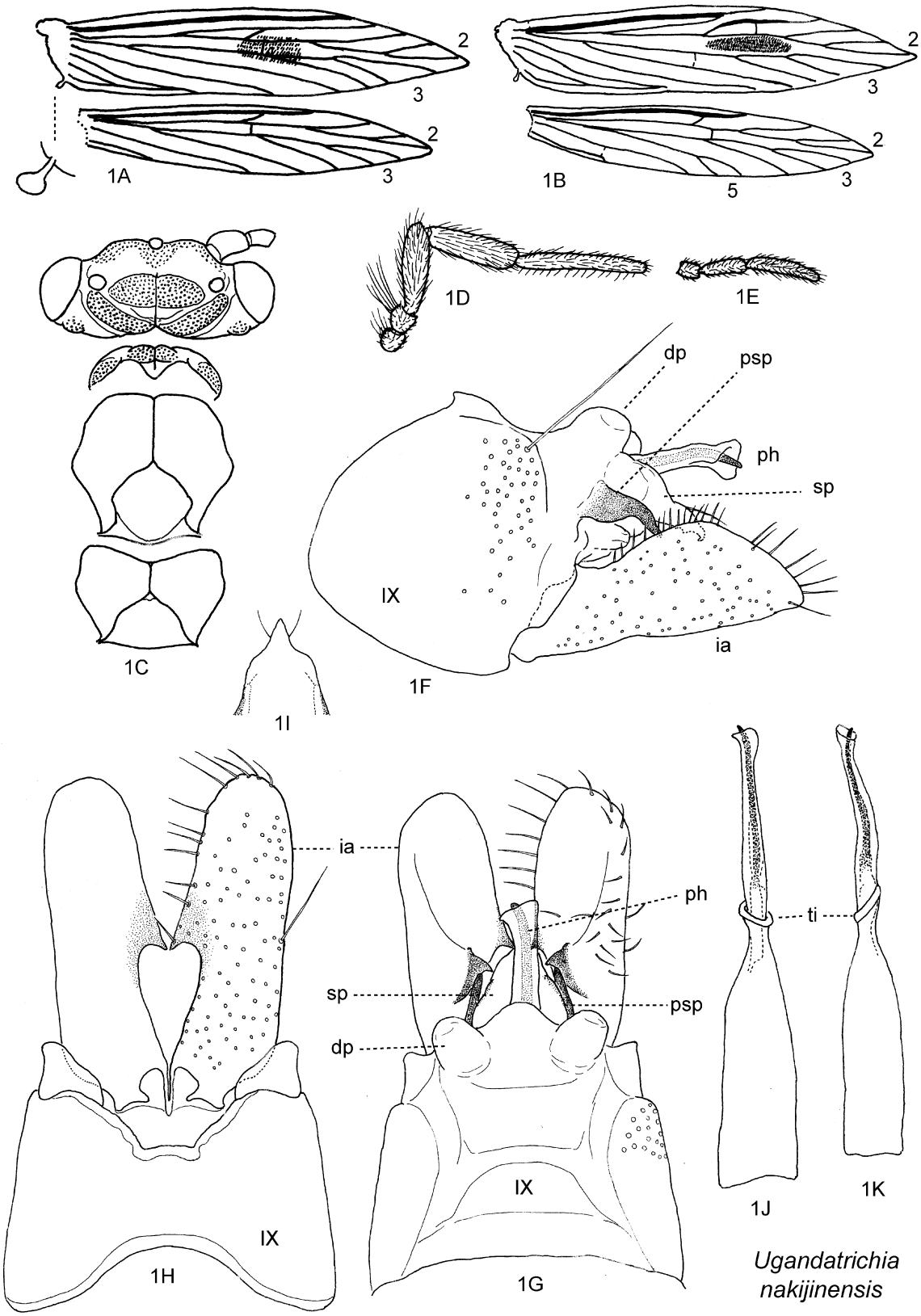

FIGURE 1. *Ugandatrichia nakijinensis*. Male (B, Amami-oshima, Yamato-son; others, type locality in Okinawa-jima). A, B, right wings, dorsal; C, head and thorax, dorsal; D, maxillary palpus; E, labial palpus; F, genitalia, left lateral; G, same, dorsal; H, same, ventral; I, distal part of subgenital plate, dorsal; J, phallus, dorsal; K, same, right lateral. Abbreviations: 2–5, 2nd–5th apical forks; IX, abdominal segment IX; dp, dorsal plate; ia, inferior appendage; ph, phallus; psp, paired sclerotized process; sp, subgenital plate; ti, titillator.

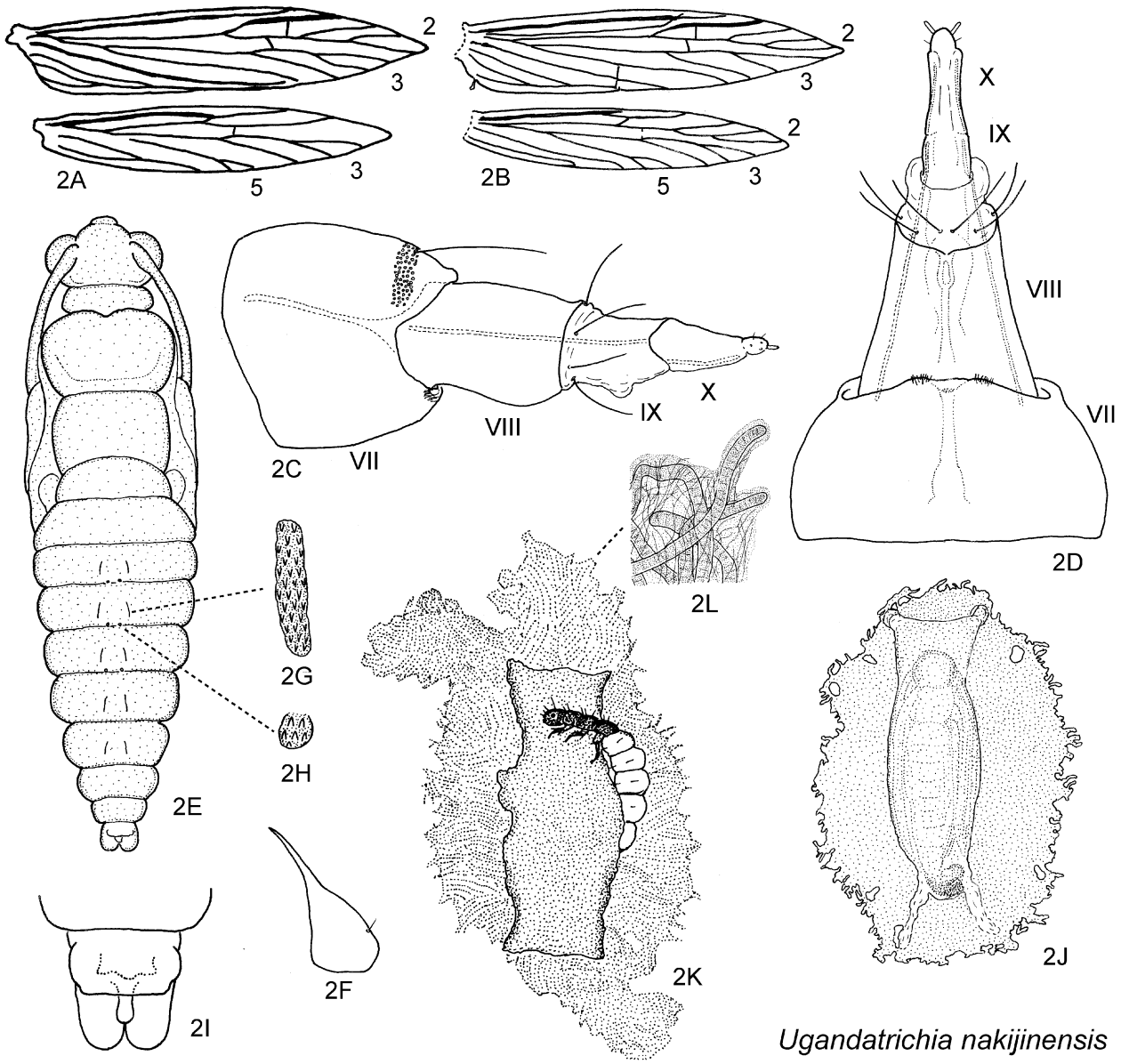

FIGURE 2. *Ugandatrichia nakijinensis*. Female, pupa and cases (B, Amami-oshima, Yamato-son; others, type locality). Female (A–D): A, B, right wings, dorsal; C, segments VII–X, left lateral; D, same, ventral. Pupa (E–I): E, dorsal; F, right mandible, dorsal; G, long hook plate; H, round hook plate; I, posterior parts of abdomen, dorsal. Case (J–L): J, pupal case, from below; K, larval case, from below, larva stretches out from one of lateral openings; L, enlarged figure of part of case made of silk together with filamentous algae. Abbreviations: 2–5, 2nd–5th apical forks; VII–X, abdominal segments VII–X.

Head. Uniformly dark brown, semi-rectangular, width up to 0.32 mm, length slightly longer than width; frontoclypeal suture fused; several primary setae very long, longest seta 1.8 times as long as head width. Antennae situated between anterior edge of head capsule and respective eye spots, each unsegmented with subapical seta. Mandibles stout with blunt apices, blunt teeth and dense mesal brushes; brush setae more or less serrated. Labrum weakly sclerotized, brushes of setae not visible or absent at anterior margin.

Thorax. Dorsum of each segment covered with 2 large square plates; plates dark brown with black borders on meso- and metanota; each plate with 20–25 setae. Prothorax with pair of large ellipsoidal ventral sclerites; mesothorax with pair of narrow ventral sclerites. Thoracic legs short and stout; foretibial spurs paired, subacute apically; each of middle and hind tibial spurs single, acute apically; other structures similar in three legs. Anterior part of foretrochantin elongate, rectangular with irregularly protruded margin; posterior part of trochantin ellipsoidal. Episterna small and epimera large ellipsoidal on meso- and meta-thorax.

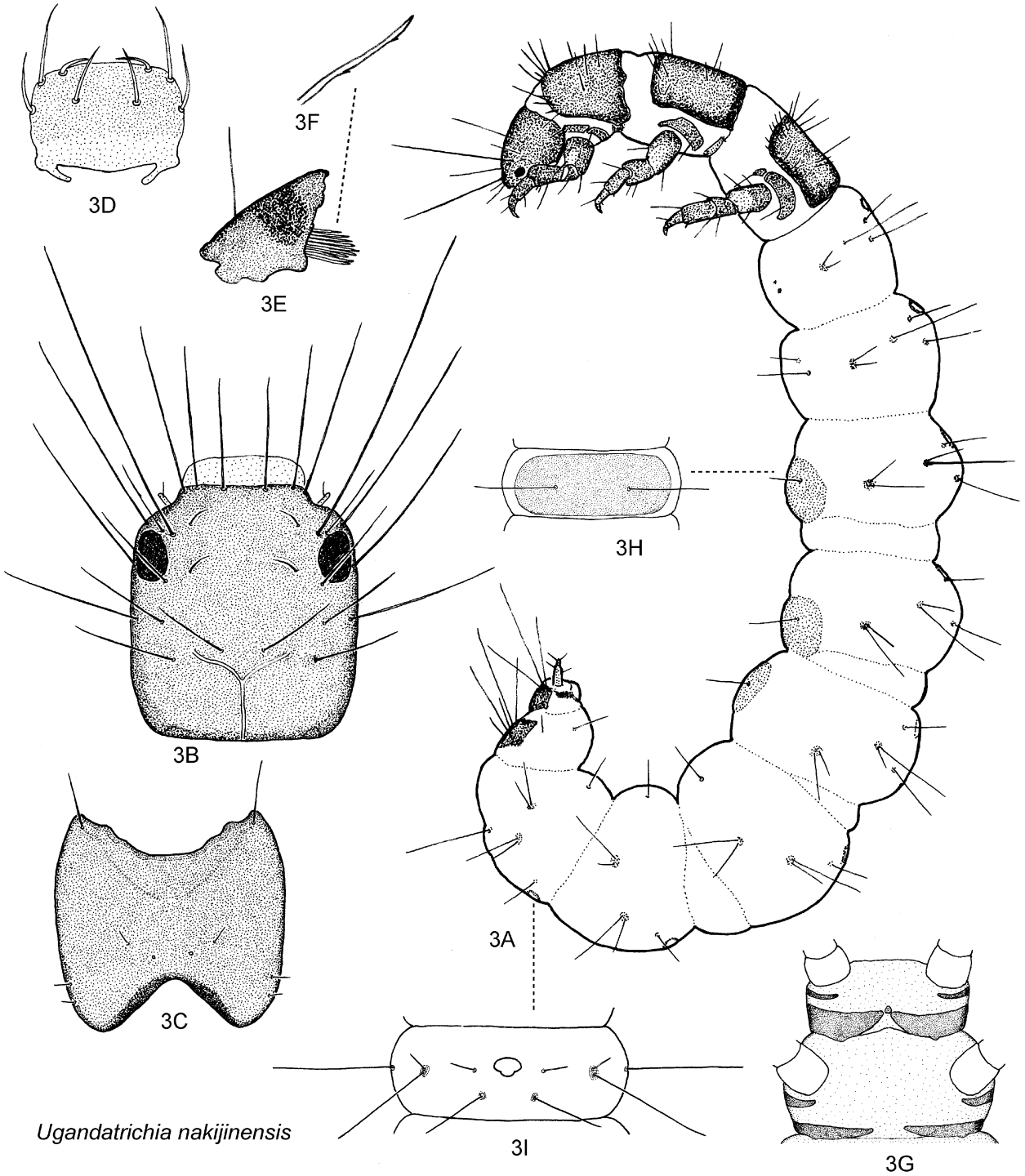

FIGURE 3. *Ugandatrichia nakijinensis*. Final instar larva (type locality). A, left lateral; B, head, dorsal; C, same, ventral; D, labrum, dorsal; E, right mandible, dorsal; F, mesal seta of mandible; G, pro- and meso-thoracic segments, ventral; H, abdominal segment III, ventral; I, abdominal segment VIII, dorsal.

Abdomen. Cylindrical but middle of abdomen slightly swollen. Tracheal gills, humps, lateral fringes or lateral tubercles absent. Setae on dorsum of segments I–VIII 1, 1–2 and 2 at setal area 1, 2 and 3, respectively, one seta on setal area 3 long; 2 setae at lateral line on each of segments I–VIII. Chloride epithelia with black border present near anterior margin of terga I–VIII; epithelia on tergum I round and those of terga II–VIII threelobed. Large orange ventral sclerites appearing on segments III–V, varying according to larval growth. Dorsal sclerite of tergum IX rectangular with 3 pairs of long and 2 pairs of short setae. Lateral sclerites of segment X long, rectangular with 3 pairs of long setae. Anal claws directed laterad or antero-laterad, without accessory hooks.

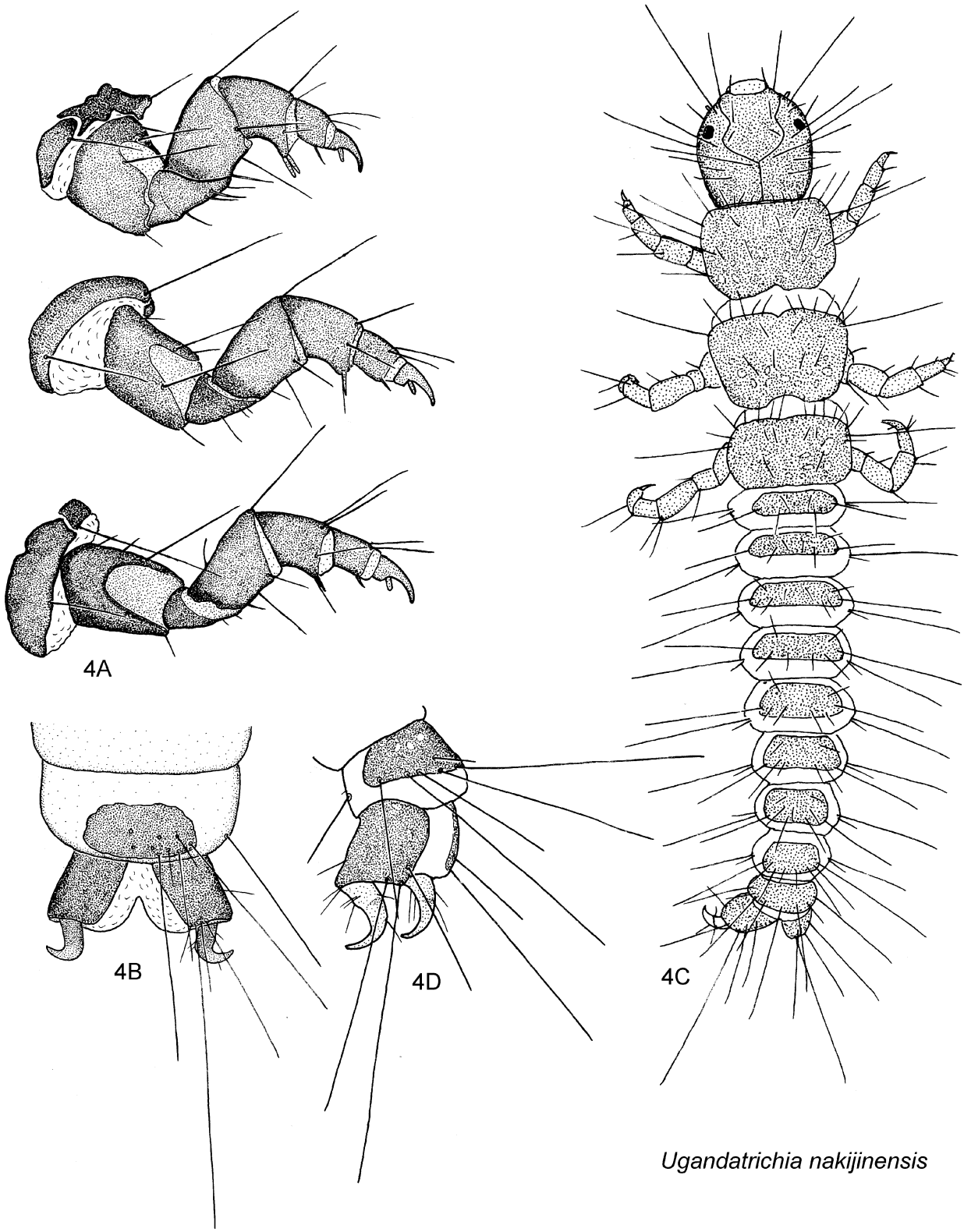

FIGURE 4. *Ugandatrichia nakijinensis*. Final and early instar larvae (type locality). Final instar larva (A, B): A, 3 thoracic legs and pleura; B, abdominal segments IX and X, dorsal. Early instar larva (C, D): C, dorsal; D, abdominal segments IX and X, dorso-lateral.

Early instar larva (Fig. 4). Campodeiform. Head width up to 0.28 mm, body length up to 3.8 mm. Sclerotized parts brown to dark brown, other parts pale brown. Each of thoracic dorsal plates subquadrate, without ecdysial lines. Ventral sclerites absent on thorax and abdomen. Each of abdominal segments with large subquadrate dorsal sclerite. Anal prolegs rather slender and elongated postero-ventrally. Other characters as in final instar larva.

Case (Fig. 2). Retreat-like cases of final instar larva and pupa made of secretion (silk), semi-transparent, rather flat, consisting of outer oval dome (net according to Malicky 1999) and inner long rectangular tube. Outer dome tightly attached to rocky substrates at anterior and posterior margins; both larval and pupal cases sometimes including filamentous algae woven together with secretion. Inner tube tightly attached to undersurface of dome, made of secretion alone never with filamentous algae; in larval stage tube, attached at four corners and with mid-lateral openings; pupal tube, tightly attached at four corners and also at middle of lateral margins. Early instar larvae of this species or larvae of *Stactobia* (another hydroptilid genus) or chironomids often found inside the cases.

Holotype: Japan, **Okinawa, Okinawa-jima**: 1 male, Nakijin-son, Shigema-gawa (26˚41'N, 127˚56'E, 75 m above sea level), 9.iv.2011, TI & T. Kitamura, S (CBM-ZI 146122).

Paratypes. 8 males, 5 females, same data as holotype (CBM-ZI 146123–146135).

Other specimens examined. **Japan, Okinawa, Okinawa-jima**: 30 males 5 females, same data as holotype; 4 pupae, 8 larvae, type locality, 17.iii.2012, TI & T. Kitamura, S; 1 pupa, 1 prepupa, 2 larvae, Kunigami-son, Oku, small fall, 21.iii.1999, TI & AO; 1 female, 5 larvae, Kunigami-son, Yambaru-no-mori, small fall, 21.iii.1999, TI & AO, S; 3 pupae, Kunigami-son, Fun-gawa, Tanaga-gumui, 22.iii.1999, TI & AO. **Japan, Kagoshima, Amami-oshima**: 1 male, Yamato-son, Materia-no-taki, 29.iii.1998, H. Nishimoto; 2 males, ibid., 25–26.x.2011, TI, S; 1 female, Uken-son, Arangachi-no-taki, 26.x.2011, TI, S; 1 pupa, 11 larvae, Uken-son, a hygropetric habitat near Kawauchi-gawa, 20.iii.1999, TI & AO.

Diagnosis. The male of this species is similar to that of *U. taiwanensis*, in having the conspicuous sclerotized processes above the large, broad inferior appendages, but is clearly distinguished from the latter by presence of androconia on forewings, round humps laterally on dorsal plate, a dorso-mesal second spur on each inferior appendage. The females is also very similar to that of *U. taiwanensis*, but is distinguished from the latter by the shape of sternite VII in ventral view with posterior margin smoothly rounded compared to the large convex area of short dense setae in *U. taiwanensis*. Pupae and larvae are very similar to those of *U. taiwanensis* and could not be distinguished from those of the latter.

Etymology. The specific name refers to the type locality.

Distribution (Fig. 6B). Japan (Okinawa-jima, Amami-oshima).

Habitat (Fig. 6A). Larvae and pupae of this species live on smooth surfaces of rocks on waterfalls and in very fast flowing waters.

Japanese name. Nakijin-ô-hime-tobikera.

Ugandatrichia taiwanensis Hsu and Chen, 2002

(Figs. 5, 6B)

Ugandatrichia taiwanensis Hsu and Chen, 2002, 74–79, male, female, pupa, larva, case, habitat, Taiwan.

Adult. Wings black, densely covered with long black hairs, lines of dense scales on some veins especially at base of male forewings. Antennae black at basal 1/3 and white at apical 2/3.

Male (Fig. 5). Length of forewing, hind wing and body 3.6 mm, 3.2 mm and 3.1–3.5 mm, respectively. Forewings each with apical forks II and III, hind wings each with apical forks II, III and V. Antennae each 31–32-segmented and 1.6 mm long.

Genitalia (Fig. 5). Segment IX large, round in lateral view, subquadrate in dorsal view. Dorsal plate membranous; wide, round postero-laterally in dorsal view, in lateral view hump-like. Subgenital plate distinctly longer than dorsal plate, broad-based, tapered to narrow apex, directed ventrad apically, with pair of setae subapically. Inferior appendages stout, large, twice as long as subgenital plate, setose; in lateral view slightly thickened at middle, tapered distally, somewhat rounded apically; in ventral view parallel sided with round apices; each with two spur-like processes near middle of dorso-mesal margin. Paired sclerotized processes above inferior appendages, triangular in lateral view, semi-circular in dorsal view. Phallus long, titillator curled once at about 2/3 from base, ejaculatory duct slightly projecting.

Female (Fig. 5). Length of forewing, hind wing and body 4.1 mm, 3.3 mm and 3.2–3.8 mm, respectively. Forewings each with apical forks II and III; hind wings each with forks II, III and V, crossvein R+M sometimes absent. Antennae each 32-segmented and 1.6 mm long.

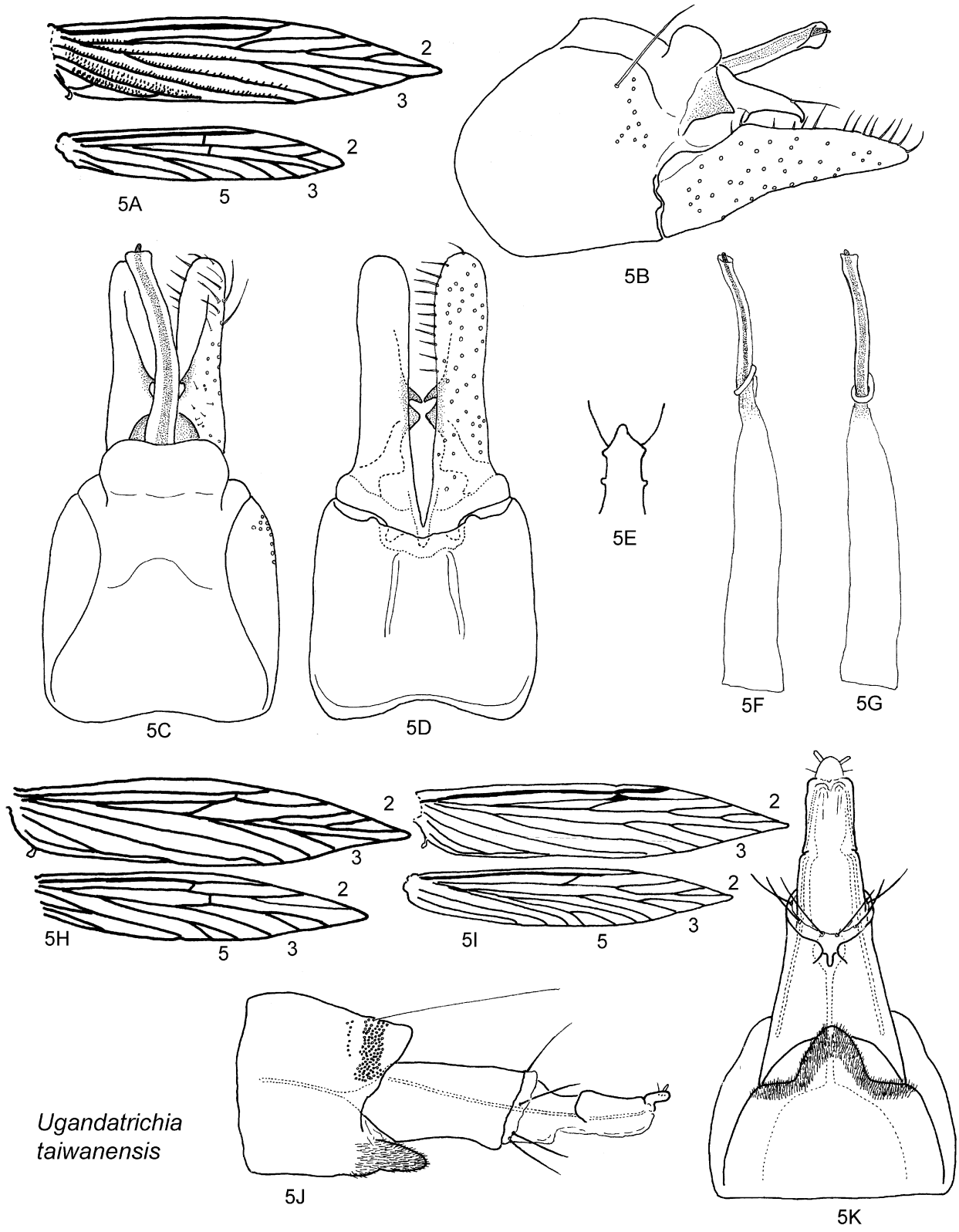

FIGURE 5. *Ugandatrichia taiwanensis*. Male (A–G, Iriomote-jima, Kampira-no-taki): A, right wings, dorsal; B, genitalia, left lateral; C, same, dorsal; D, same, ventral; E, distal part of subgenital plate, dorsal; F, phallus, right lateral; G, same, dorsal. Female (H–K; I, Ishigaki-jima, Omoto-dake; others, Iriomote-jima, Kampira-no-taki): H, I, right wings, dorsal; J, segments VII–X, left lateral; K, same, ventral. Abbreviations: 2–5, 2nd–5th apical forks.

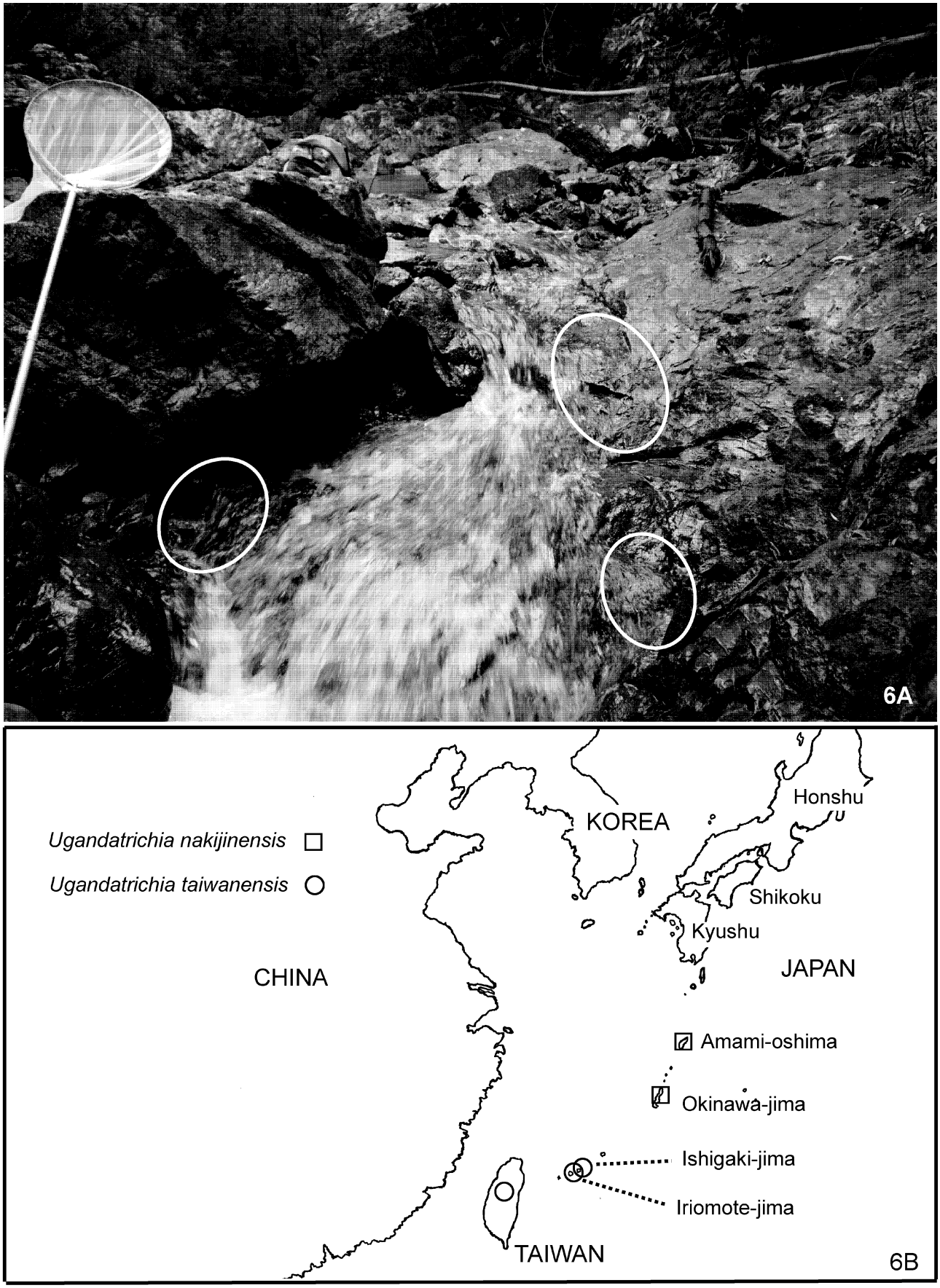

FIGURE 6. Habitat and distribution. A, A typical stream habitat of *Ugandatrichia nakijinensis*, with 3 sites where larvae and pupae were found indicated by circles (type locality); B, distribution of the 2 species.

Segment VII: Tergite and sternite fused laterally, weakly sclerotized; tergite subquadrate with row of numerous very long setae near posterior margin; in ventral view, sternite straight anteriorly, slightly convex laterally, with middle large subtriangular projection and dense setal band posteriorly. Segment VIII almost as long as segment VII, with middle excision and 4 pairs of long setae posteriorly.

Pupa, larva and case. Very similar to those of *U. nakijinensis* **sp. nov.**; no distinguishing features discernible.

Specimens examined. **Japan**, **Okinawa, Iriomote-jima**. 31 males, 11 females, 2 pupae, 91 larvae, Urauchi-gawa, Kampira-no-taki, 25.iii.1999, TI & AO, sweep & pick up; 5 males, 5 females, 10 pupae, 18 prepupae, 8 larvae, ibid., 25.iii.1999 (larvae), reared & emerged (or preserved) in iv.1999, TI & AO; 13 males, 21 females, ibid., 14.iv.2005, TI, S; 2 males, Mihara, 21.iii.1996, F. Nishimoto; 1 pupa, 1 larva, Nishi-funatsuki-gawa, Nishi-funatsuki-bashi, 23.iii.1999, TI & AO, S. **Japan, Okinawa, Ishigaki-jima**. 2 males, 5 females, Mt. Omoto-dake, small fall near foot path, 13.iv.2011, TI, S.

Remarks. Specimens of this species collected from Iriomote-jima and Ishigaki-jima coincide almost completely with those of the original description of this species (Hsu & Chen, 2002). A small difference is seen in the forewing venation of males: R1 joins to R2 in the Taiwanese specimens but R1 joins to Sc in the Japanese specimens. The venation may be different locally in this species as in *U. nakijinensis* **sp. nov.**

Ugandatrichia taiwanensis is similar to *U. nakijinensis* as described in remarks of the latter, but adults of the 2 species are clearly distinguished as follows: In the male, androconia on forewings, round lateral humps of the dorsal plate, and a dorso-mesal second spur of each inferior appendage are present in *U. nakijinensis* but absent in *U. taiwanensis*; in the female, the posterior margin of sternite VII is smoothly rounded in *U. nakijinensis*, but largely convex in *U. taiwanensis*. Pupae and larvae of the 2 species are very similar and could not be distinguished from each other.

Ten caddisfly species are known from both Taiwan and the southernmost part of Japan: *Rhyacophila formosana* Ulmer (Kuranishi 1997), *Hydroptila thuna* Oláh (Ito *et al*. 2011), *Ecnomus tenellus* Ramber (Shimura 2010), *Tinodes higashiyamanus* Tsuda (Shimura 2010), *Micrasema hanasense* Tsuda (Shimura 2010), *Lepidostoma ebenacanthus* Ito (Ito 1992), *Lepidostoma doligung* (Malicky) (Shimura 2010), *Adicella makaria* Malicky & Chantaramongkol (Shimura 2010), *Oecetis spatula* Chen (Shimura 2010) and *Anisocentropus kawamurai* (Iwata) (Ito *et al*. 2012). This is the eleventh caddisfly species in common between Japan and Taiwan.

Distribution (Fig. 6B). Japan (Iriomote-jima, Ishigaki-jima), Taiwan. New to Japan.

Habitat. Larvae of this species also live on rocky substrates on waterfalls and in very fast flowing waters.

Japanese name. Taiwan-ô-hime-tobikera (newly given here).

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